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ABSTRACT

This manual for the preparation of original motion picture film for printing discusses the importance of careful handling of the original camera film, briefly reviews the professional production system for making 16mm films, and presents the advantages and disadvantages of sending the original camera film together with the work print to a laboratory for cutting and matching in-house. Equipment and facilities needed if the film is to be cut in-house (and then sent to a laboratory for printing) are described, procedures for organizing the editing and finding the desired shots in the original film are detailed, and step-by-step instructions illustrated with line drawings are provided for cutting and splicing the film, as well as the use of A and B rolls to avoid overlapping frames when splicing. Special effects such as dissolves and superimpositions that can be produced by the laboratory during the printing process are also explained, and guidelines are provided for marking the film and writing instructions for the laboratory. (MER)

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HOW TO PREPARE ORIGINAL MOTION PICTURE FILM FOR PRINTING, INCLUDING A AND B ROLLS

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PREPARING ORIGINAL FILM FOR PRINTING

The purpose of professional film production is to make multiple copies of a film. Film production is expensive, and the only justification of a large investment in a production is a very wide viewing audience. The larger the audience, the smaller the cost-per-viewer. If a film costs $30,000 to produce, and it is eventually seen by an audience of 100,000, then the cost-per-viewer is only 30 cents! This is a very efficient means of communication, cheaper than many other apparently less expensive forms, such as brochures, newsletters, tape-slide programs, etc.

So film is best considered as a mass-medium, when a large audience can be reached. For this reason the film producer must follow the proper procedures to obtain the maximum viewing audience. From this logic it follows the original film must be treated with the utmost care, as the entire distribution program for the production depends on the principle of printing. An original negative of a film must never be projected, for example, as such projection would scratch the film. Original negative handling requires an altogether different discipline of handling than, for example, release prints, or work prints. The quality of the release prints can only be as good as the quality of the original negative.

The original negative should be considered a very valuable object. Consider a feature film production, costing several million dollars. This means that the original negative is itself worth several million dollars, perhaps worth more than its weight in gold! It is for this reason that professional film companies keep their original negative locked in guarded vaults, under the very best of environmental conditions.

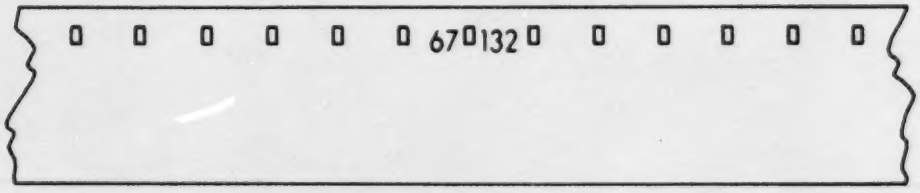
Even a small film production organization should develop a special attitude toward the negative. It is to be considered precious, fragile, delicate, and not to be trusted to inexperienced hands.

NOTE: The word, "negative" here means the original film which was exposed in a camera. Sometimes this is a "negative," but sometimes the original is not a negative, but a reversal positive film, such as Ektachrome Reversal Type 7242 or Ektachrome Commercial, type 7252. For this paper both types of film, original negative and original reversal, will be called "original." It means the original camera film.

To quickly review the professional production system for making 16 mm films, the producer begins with professional 16 mm camera film, either negative or reversal. Such film is designed for duplication, and not for projection. Since it is designed for duplication, it has a clever system of helping film makers relate the duplicate print with the original.

All camera original film is manufactured with small 5-digit serial numbers printed photographically on the edge of the film. In 16 mm film, these numbers are printed every 20 frames.

These numbers are called "edge numbers," and they look like this:



ORIGINAL CAMERA FILM

The next number, 20 frames away, would be 67133, etc.

These numbers are not visible until the film has been developed. The lowest number would be 00000, and the highest 99,999. After that, the number series repeats, beginning at 00000, 00001, etc., every twenty frames.

Film designed to be printed on, however, does not have edge numbers put on by the manufacturer. If you were to develop a piece of print film, you would find no edge numbers on the film.

After you expose some film in your movie camera (negative or reversal) you send it to a laboratory for processing. Then, at the laboratory, under very carefully controlled conditions, your original camera film is developed, which as we have seen not only results in photographs, but in visible five-digit edge-numbers.

At the laboratory your original camera film is next printed, by contact, with a roll of printing film. This print film is then developed, and you will see not only an exact copy of the photographs on the original film, but also an exact copy of the original edge numbers.

This print is called the "work print," and this is what you will project to see what you photographed, and this is what you will edit.

In the meantime, the original film is safely stored away, under proper temperature and humidity conditions. You will probably not see it again for several months, not until your work print is edited.

Let us now assume that time has passed, and the work print has been edited. Out of all the work print that you started with, you have selected only the parts that you needed to achieve the objectives of the production. You might have started with 10,000 meters of film, but the final edited work print is only 1,000 meters, consisting of various lengths of work print, assembled by an editor in the required sequence, or order. This is called, "work print editing," or sometimes just "editing." This is the creative process that results in the final form of the film.

You now need to distribute your film to your intended, "target" audience so you will need many duplicates, or copies of the film. But it would be very foolish to duplicate, or print, the edited work print. Why ? Because the work print, in the weeks or months it took in editing, was projected many

times, and became very scratched. Any prints made from this work print would thus also show the scratches, and would be very unsatisfactory.

You now have two choices:

1. Send your edited work print to the laboratory, with instructions to the laboratory to match, or conform, the original negative to your edited work print. If the laboratory offers this service, they will take your original camera film out of the storage vault, and using your work print as a pattern, they will cut and splice (join) the negative to match it exactly. Then from the cut and spliced negative, which is clean and unscratched, the required number of release prints can be made.

2. You can do the negative cutting (matching) yourself and send the cut and spliced negative to the laboratory for release printing.

The advantages of having the laboratory do the negative cutting are:

A. They will have the specialized equipment to do the job.

B. They will have trained people to do the work.

C. This will be a routine service for them, one that they do for many producers, so their procedures would be standardized.

The disadvantages of having the laboratory do the negative cutting are:

A. They may take a long time to do the work. They may have other priorities which will cause them to delay working on your film.

B. The cost can be quite expensive. They may charge for their time, and as you have no way of checking on how much time they really spend on your film you must accept their statement. Or they may charge by the length of the film, and you will discover that these charges are indeed expensive.

C. If you are not careful in communicating your requirements to the laboratory, you may not get the effects you want.

The advantages of cutting the negative yourself are:

A. You can get the film ready for printing in a relatively short time, if you are willing to spend the time in a painstaking, essentially non-creative, clerical task, which is the nature of negative cutting.

B. You can be sure the cutting will be done the way you want it done, with the effects that you want. You have control.

C. You can save quite a bit of money.

The disadvantages of cutting the negative yourself are:

A. For a creative person, it is a very boring job, requiring great patience.

B. It requires special equipment, and a very clean work space.

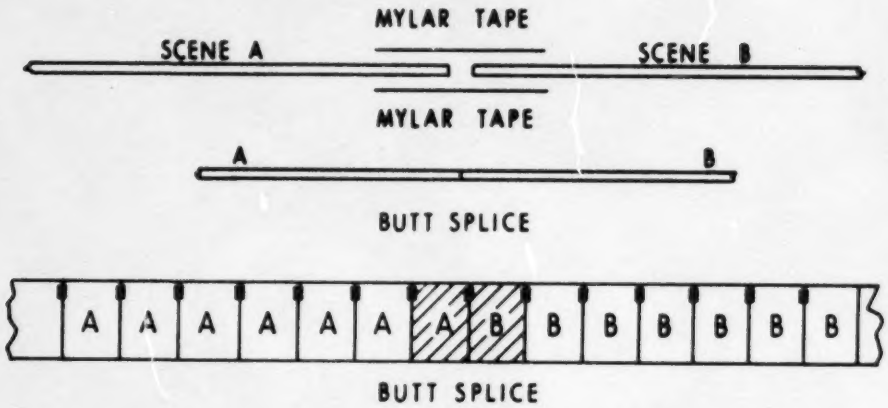
C. It is difficult to get enough experience to become really skilled, as your production volume may be quite low, in comparison to the number of films passing through a laboratory. So each time you cut a negative, it will be a somewhat new learning experience.

Now let us say that you have examined the advantages and disadvantages of sending your work print to a laboratory for negative cutting versus doing it "in house," or in your own production facilities. If you make the decision: we will cut our own negative, then you will need certain pieces of equipment, and certain facilities-that is, space.

First, the equipment:

1. A film splicer that makes an overlap, cement splice. You may say, "But we already have a perfectly good splicer, which we used to edit our work print." But most likely that is a splicer which uses adhesive mylar tape. This type of splicer cuts right on the frame line, and makes a "butt" splice, with tape pressed

onto both sides of the film to hold it together, thus:

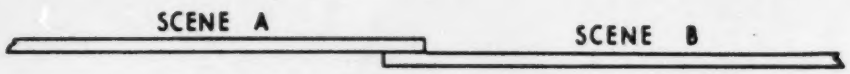


Such a splicer which uses tape is quite satisfactory for editing work prints, but it is not satisfactory for splicing original negatives, for these reasons:

A. In spite of the fact that mylar splicing tape is very clear and transparent, still, when you press this tape onto a splice the tape covers at least two frames, one on either side of the splice. This changes the thickness of those two frames, and changes the amount of light that can pass through those two frames. The result is that when a print is made from a negative with tape splices, each time a splice is projected you can see it! You will be aware that the film is made up of separate shots, joined together. This can be very distracting. It is "noise" in the communication system.

B. But an even more serious reason for not using tape splicers for splicing original film is that the laboratory will not accept such film for printing! Why not? Because they have found that quite often taped splices come apart during printing. This causes considerable trouble to the technicians, who must spend time repairing such splices, and it means that the printing process must be started all over again from the beginning, with a waste of printing film. Also, the sticky tape splices sometimes jam in the printing machinery, again causing all sort of problems. So they may refuse to accept your tape-spliced film for printing.

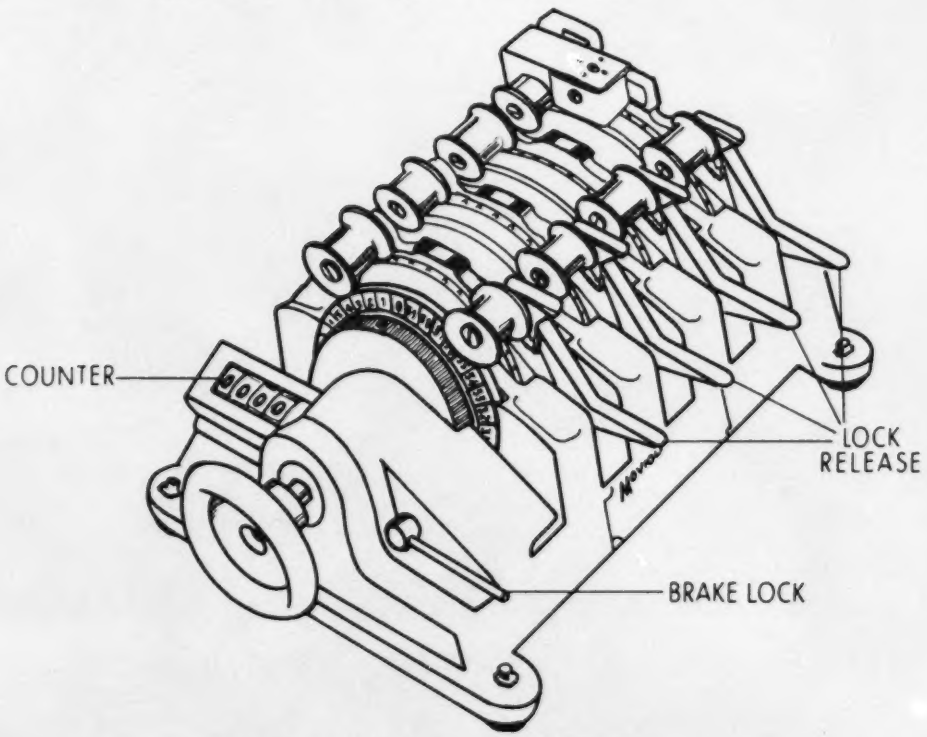
An answer to the problem is to use the "overlap cement" splice. The splicer for this is quite different from the tape splicer. In the cement splicer the two scenes to be spliced together are overlapped a little bit:



OVERLAP
SPLICE

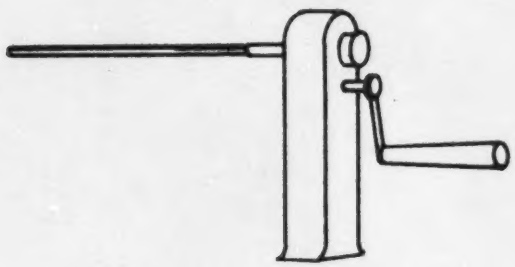
Where the two scenes overlap a small amount of film cement is brushed on the film, causing the two pieces of film to stick together very firmly! If made properly, such splices will not come apart in printing. Of course you can also use a cement (overlap) splicer for editing work print, but most work print editors prefer the tape splicer, because splices can be made very quickly.

2. You will need a "Four-gang synchronizer." This is a machine for holding four strips of film in exact synchronism with each other. It has four wheels, with sprocket teeth which fit the holes (perforations) in the film. All four wheels are fixed on the same shaft, or axle, so that all the wheels turn together. There are locks which hold the strips of film on the wheels. There may be a counter on the synchronizer, which will measure feet and frames.



FOUR GANG FILM SYNCHRONIZER

3. You will need a pair of film "rewinds" with long shafts, to hold at least four rolls of film.



Long shaft rewinds for four reels

TWO OF THESE REWINDS ARE REQUIRED

4. You will need a very sharp steel needle, or "scribe." This is for marking the edge of the film.

STEEL SCRIBE

5. You should have some clean white cotton gloves, to protect the film from the sweat of your hands.

6. There should be a storage cabinet to hold the many small rolls of film that you will handle during the negative cutting.

7. Naturally, a pair of scissors, and spare film reels, and plastic cores, film marking pens, paper, masking tape, etc.

So much for equipment. Next, the room. Original film cutting requires a very clean environment. You will need a room which is easy to clean, with enough space for a work table on which will be attached the rewinds, and which will hold the four-gang synchronizer. There should be a film storage cabinet.

The room should be air-conditioned. While it is being used for original cutting it should not be used for any other purpose.

You are now ready to begin to cut the original film to match the edited work print.

"PULLING THE ORIGINAL SHOTS"

The first thing you must do is to make a list of all the shots in the work print. This is very easy to do. Put the work print on the rewinds with some writing paper on the table. You might also need a small magnifying lens. Beginning with shot number one, look for the first 5-digit edge number you can read. Write this down. Now wind on to the end of that shot, i.e., to the splice, and look for the last 5-digit number on the end of shot number one. Write it down. Then onto shot number two, etc., until you have made a complete list of all shots in the work print noting the beginning and end edge-numbers of every shot. Your list might look something like this:

SHOT LIST

SHOT	BEGIN	END
1	05729	05788
2	66792	66851
3	14031	14129
4	88551	88565
5	88568	88572
6	88602	88609
7	99057	99102
8	16727	16788
n	.....	.....

Now you have a list of every shot in the work print, with all the edge numbers.

The next step is to make another list, this time putting the shots in a priority of edge-numbers, from the highest to the lowest. From the shot list example given above, which is the highest edge-numbered shot? It is shot number 7, (99057 to 99102). What is the next highest numbered shot? It is shot number 6, (88602 - 609), and so on.

So this list (for this example) would look like this:

EDGE-NUMBER PRIORITY LIST

SHOT	EDGE-NUMBERS	FOUND
7	99057-99102	
6	88602-690	
5	88568-88572	
4	88551-88565	✓
2	66792-66851	

Can you complete this list? Try it.

When you have finished, you will have a list of shots by edge-numbers, from the highest to the lowest, in the work print.

Your next task is to find those shots in the original rolls of film. Now is the time for cleanliness, and great caution! From the large pile of film cans containing your original film, take any one, at random. Put it on the rewinds. Now very carefully wind the film, and you will notice that the film is on the roll TAILS OUT. This means that the highest numbers on that

roll will be the ones you will read first. (Because you are examining the roll from the end. This is the way laboratories generally mount original film; tails out. If by some chance the film is HEADS OUT (or beginning out) then you must rewind the film first, as you need the film tails out).

As you wind the film, from the tail, look for edge-numbers from your "priority list." Soon you will find one which corresponds to one of the shots on your list. With your scissors carefully cut the original film at the very end of the shot. This is the place where the camera stopped for that shot. You can usually tell where the camera stopped because there will be a "flared" frame or two, where the camera slowed down to a stop, overexposing some frames. This is where you will cut with your scissors--at the end of the camera "take." Now carefully start rolling that camera shot into a small roll, until you come to the beginning of the camera "take." You might find a camera slate there. Cut with your scissors at the beginning of the take.

You now have found one of the shots which corresponds to a shot in the work print. Put on some masking tape to hold the shot, and write the number of the shot on the tape. Put it carefully in a box or storage cabinet. On your "priority list" check off that you have found that shot. (Example: shot No. 4 in the priority list above.)

Continue this careful procedure until you have found, rolled up, taped, marked, and checked every shot on the shot list. Wear at least one cotton glove, preferably on the left hand. The right hand fingers should handle film only by the edges.

Because you wound each shot up from the end, now each numbered and taped shot will be HEADS OUT, ready for matching. Note that at this time you do not try to cut the original to match the length of the shot in the work print. You are not conforming; only finding! So a rolled-up (and taped and marked) shot might actually contain much more footage than the shot in the work print.

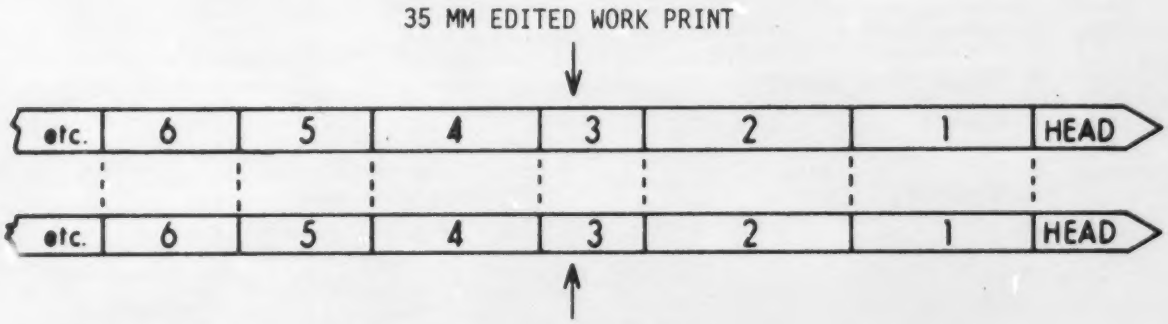
ORIGINAL CAMERA "TAKE"

In this example, shot number 7, as indicated by the beginning and end edge-number, is only a part of the camera "take." But roll up the whole take at this time. You will cut it later to the exact length.

REASONS FOR A AND B CUTTING

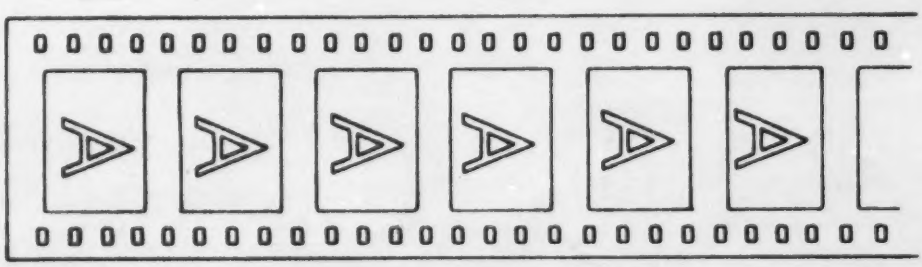
Before we explain what A and B cutting is, let us imagine that you were going to cut (or "conform") the negative for a 35 mm film, such as an entertainment feature film. You have made your shot list, your edge-number priority list, and you have "pulled the original negatives" (i.e., you have found and rolled up, taped and numbered all of the shots in the shot list).

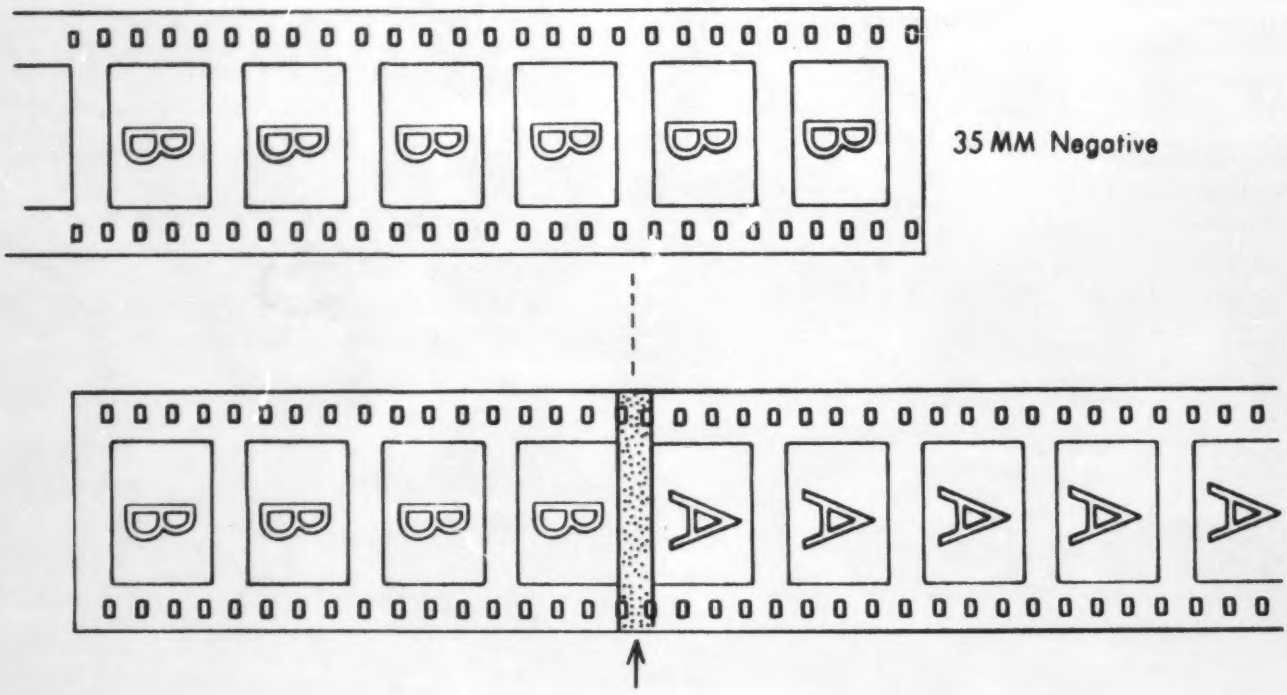
In theory, the process is very simple. Using the edited work print as a guide, you cut and splice all the negative shots to match. You will finish with a long piece of spliced negative, which will be the exact length of the work print, and the spliced negative will have every shot in it that the work print has. It might look like this:



35 MM CUT NEGATIVE

As you learned earlier, you must make cement splices, with an overlap. A cement splice is very strong, as the two pieces of film are actually "welded" together. Consider how these two shots of 35 mm negative might be spliced together:





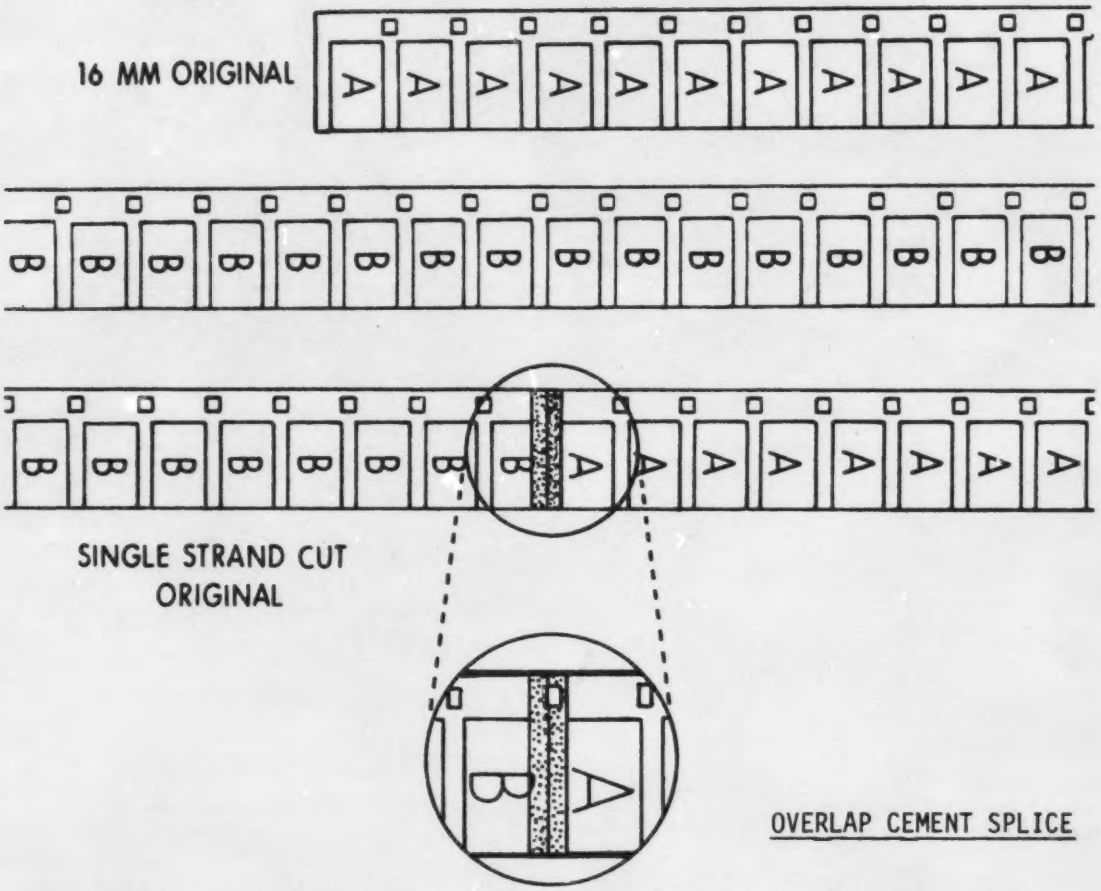
OVERLAP CEMENT SPLICE

As you can see there is enough space between 35 mm frames to make an overlap splice, and when this spliced negative is printed, the splice will not be visible on the screen when the print is projected.

It is for this reason that the cut negative of a 35 mm film is a single, long piece of film. The splices between the shots will not be seen on the screen. This sometimes called a "SINGLE STRAND" negative, and feature films (35 mm) have been cut this way for many years.

But now consider the same situation in 16 mm. Let us suppose you want to cut the original of a 16 mm educational film. As before, you have made your shot-list, your priority edge-number list, and you have "pulled" all of the required shots from the many rolls of original film. Now what?

Remember, the laboratory requires an overlap, cement splice. So using a splicer which makes such a splice, you could proceed to make a single strand cut negative to match the edited work print. Two shots spliced together might look like this:



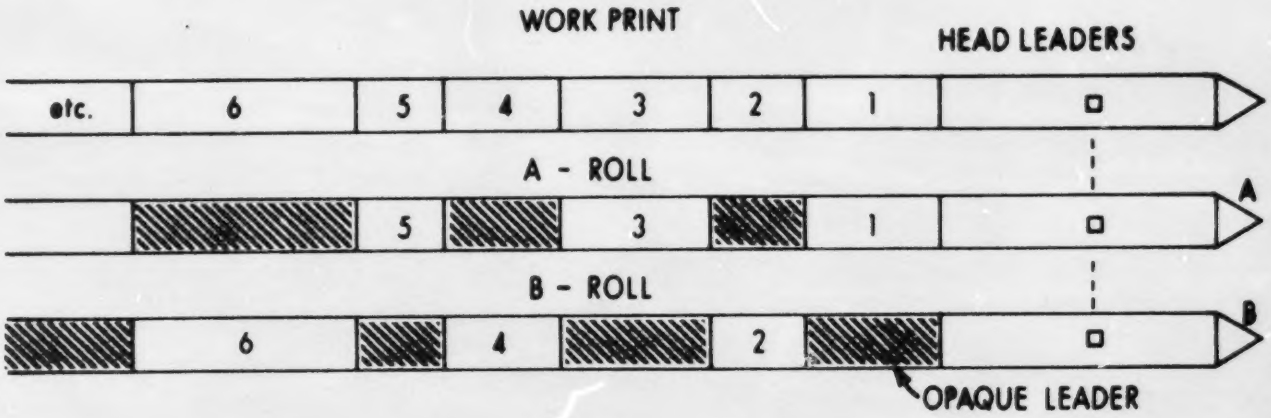
As you can see, the space between 16 mm frames is very narrow and an overlap splice actually overlaps onto one of the frames of the two shots. (You can see that part of the "B" in the above example is actually covered by the overlap splice).

Unfortunately that little bit of overlap on one frame can be seen in the projected print! Perhaps you would not be consciously aware of every splice flashing by, but just the same that overlap distracts from the smoothness of the cut. A film editor almost always notices those splices!

So we have a small problem. We could cut a single strand original, using overlap cement splices, and the laboratory would accept the cut original for printing, but we would have to accept the fact that prints made from such a negative would always show the line of the splice at every cut, which is sadly unprofessional. "Noise in the system."

There is, however, a solution to this problem (as you probably guessed). Someone invented a system of cutting the 16 mm original by which a print made from it shows absolutely no splice lines, even though overlap cement splices were used. How is this possible? This ingenious system requires that not one but two "strands" of cut negative be prepared. The two strands are called, "A and B" (but they could just as easily have been called X and Y!). Here is how you would prepare A and B rolls of original:

First you would need an additional material, which is 16 mm opaque leader, a roll at least equal in length to your work print. Opaque leader is black film, through which no light can pass. You order it from the film laboratory. Just order the length you need (or a year's supply!) specifying, "16 mm double-perforated opaque black leader, for preparing A and B printing rolls." They will know what you want. Or you may be able to buy it from your supplier of film stock. In this system, you splice all the odd-numbered shots on one roll (the A-roll) and all the even numbered shots on the other roll, (the B-roll), with opaque leader between shots:



A AND B ORIGINAL CUTTING

When you have finished cutting the original to match the work print you would have two rolls of spliced original shots, the A roll and the B roll, each of which is the exact length of the work print. You send

these two rolls to the laboratory, and request a contact release print. At the laboratory they will print the A-roll first, by contact against a piece of printing stock.

Question: If the laboratory were to develop the print stock at this point, what would be the result?

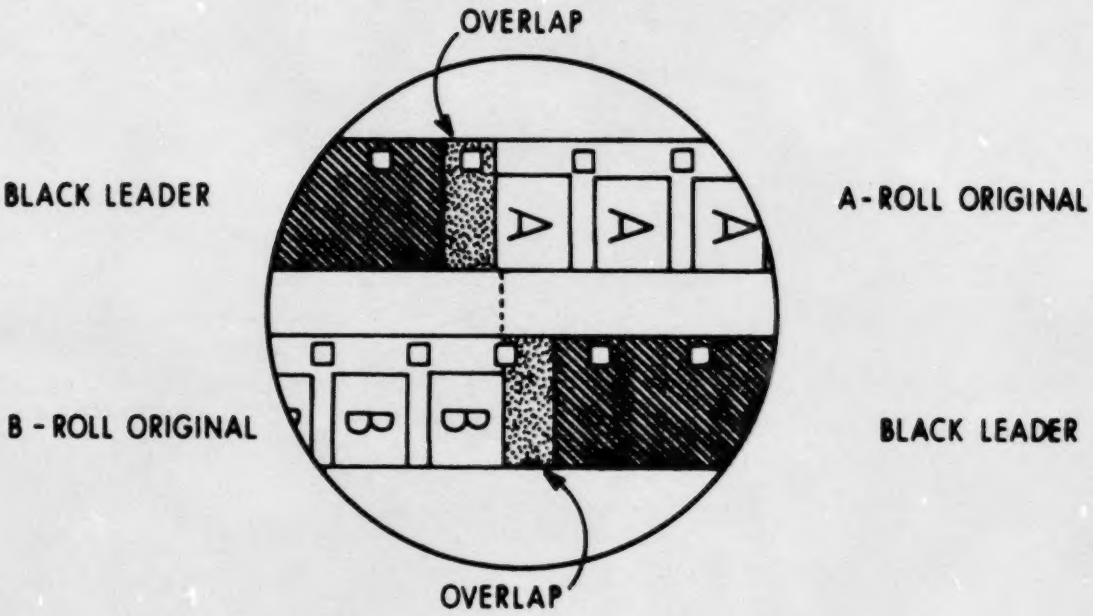
Answer: A very peculiar print! It would show only the odd-numbered shots, with black pauses in between.

But the laboratory does not develop the print at this point. Not yet. Instead, they rewind the roll of exposed print stock back to the beginning, remove the A-roll, and then load your B-roll of original on the printing machine.

Then they proceed to expose the print stock again, by contact, this time with the B-roll. Where the A-roll had opaque (black) leader during the first pass through the printer there was no exposure, because the printing light can not go through black leader. But on the second pass, with the B-roll, now those unexposed parts of the print film are exposed to the even-numbered shots. And now the print film is developed, and it will contain all of the shots. In order to keep everything in exact position, identical head leaders (of white or yellow 16 mm film) are spliced onto the beginnings of the work print, the A and B rolls, and the roll of print stock. "Start marks" are holes punched through the head leaders and these holes are used to line up the rolls on the machine for printing.

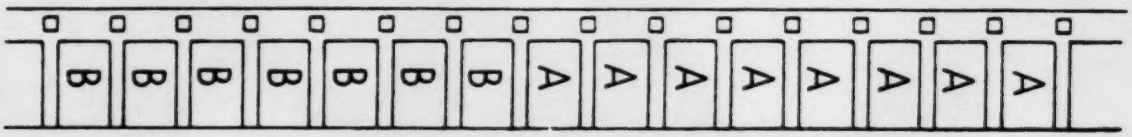
You may say at this point. "This is all very interesting, but how does this system prevent splice lines from showing on a print?"

Let us look closely at those splices on the A and B rolls. You will remember that in an overlap cement splice, the overlap is only on one of the two frames. When you splice a piece of original to black leader (in this A and B system), you make sure that the overlap always occurs on the black frame.



OVERLAP IS ALWAYS IN THE BLACK

When these two rolls are printed, there will be absolutely no splice line showing:



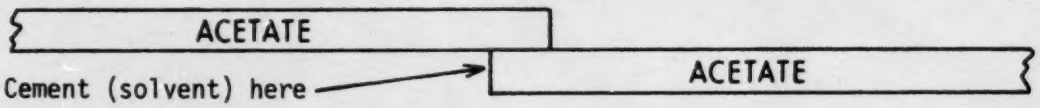
Because the A and B rolls each alternates from shots to black leader to shots, etc., this system is also sometimes called, "checker-board" cutting. There are other advantages to this system, which we will learn later.

How to make sure the overlap always occurs on the black frame:

Remember, we must make an overlap, cement splice. For this we must use a splicer designed for this purpose. Such a splicer cuts the film at the right place for an overlap splice, but you must put the film on the splicer in the correct way for this to happen. First, let us examine the nature of an overlap, cement splice:

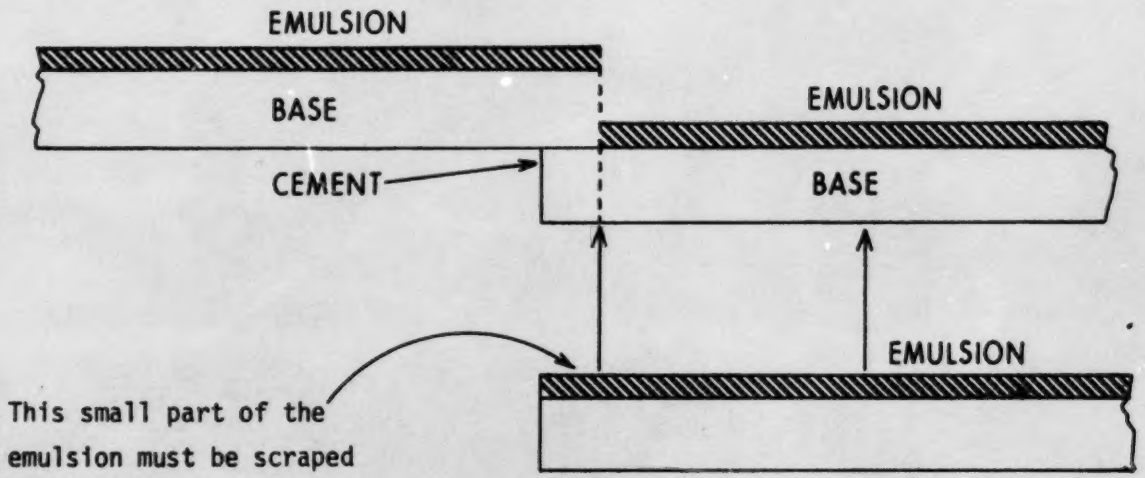
The "cement" for film is not glue, or paste, but a solvent. Film consists of a base made of a material called acetate, on which the photographic emulsion is coated. Emulsion is made of gelatine.

If film did not have an emulsion of gelatine on it, but was composed only of acetate, it would be very easy to "cement" two pieces together. You would merely apply a little film cement (solvent) across the end of the film, which would dissolve or melt the acetate a little bit. While the acetate was soft and wet, you would press the two pieces of film together. Then when the solvent dried, the acetate would become firm again, and you would have a very strong splice, like a weld. (Like sticking two wax candles together: you melt the ends of the candles, and when the wax is soft, you press them together).



However, movie film does have an emulsion of gelatine on it, and film cement (solvent) will not dissolve gelatine. So you must first remove that thin layer of gelatine emulsion before you apply the film cement. This is done by scraping with a steel blade. It takes a little practice to be able to remove only the emulsion, and not the acetate! So practice this operation.

OVERLAP, CEMENT SPLICE



In order to make sure that the overlap always occurs "in the black" in A and B roll preparation, the rule is that you place the film in the splicer in such a way that you always scrape only the picture. If you do this, then the overlap will be in the black. It is a simple rule to remember. However, many editors write those few words on a piece of paper, and pin the paper on the wall above the editing bench:

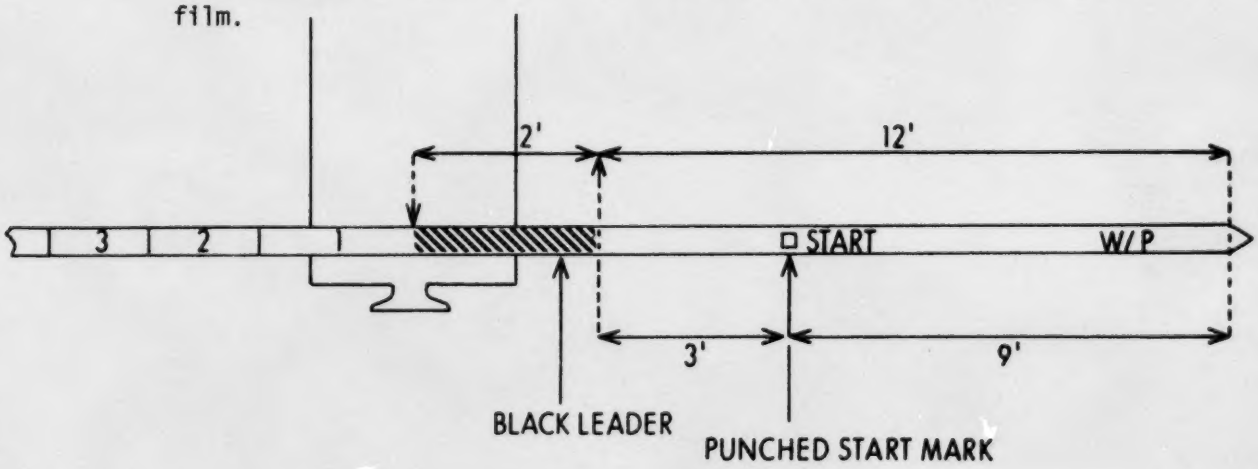
SCRAPE ONLY THE PICTURE

Cutting A and B rolls

Now that you have learned the reasons for using an overlap, cement splicer, and assuming that you have the necessary equipment (as described earlier in this paper), and also assuming that you have "pulled" all of the camera takes, have rolled them up, taped them, numbered them, and placed all of these rolls in a nearby, safe place, you are ready to begin assembling the A and B rolls. Do you also have a roll of 16 mm opaque leaders?

The first thing to do is to attach leaders to the work print and to the A and B rolls. Use ordinary yellow leader for this.

1. Put the work print in the nearest sprocket wheel of the synchronizer. Remember, a synchronizer has a footage counter, so you can measure film.

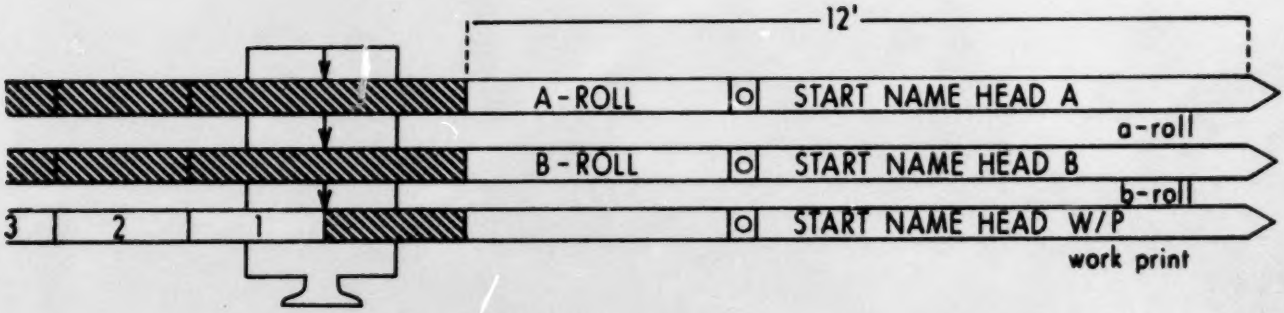


LEADER FOR WORK PRINT

To the first frame of the first scene in the work print attach exactly two feet (80 frames) of black leader. To that two feet of black leader attach 12 feet of yellow leader. At exactly 3 feet from the black leader (120 frames) punch a hole in the leader, and with a marking pen write "START" next to the hole. (Use a hand punch for this, the kind that is used for punching tickets, or holes in paper). When the leaders have been punched, lock the punched hole at the index mark for the synchronizer and set both the counter for feet and the frame count to '0.' From then on, all references to footage are counted from the '0' mark at the head.

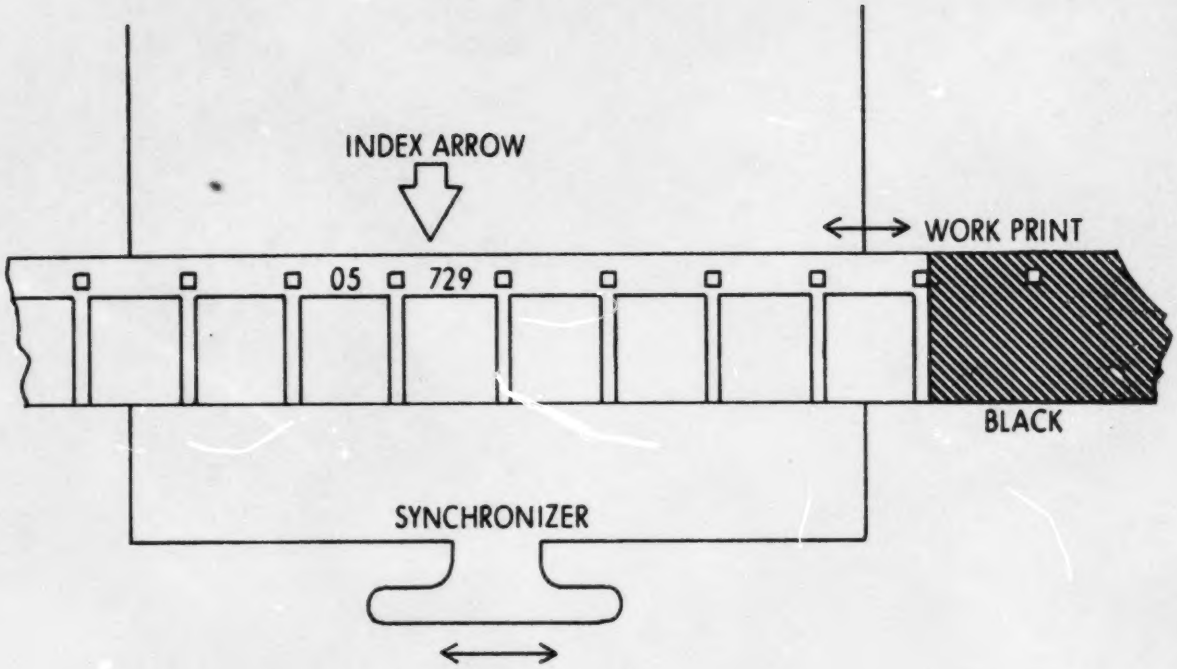
At the beginning of the leader you can use your marking pen to write the name of the production, and the words "WORK PRINT, HEAD."

2. Next make two more leaders <u>exactly the same</u>, in the next two sprocket wheels of the synchronizer, <u>but do not cut the</u> opaque leaders, leave them long at the tail.



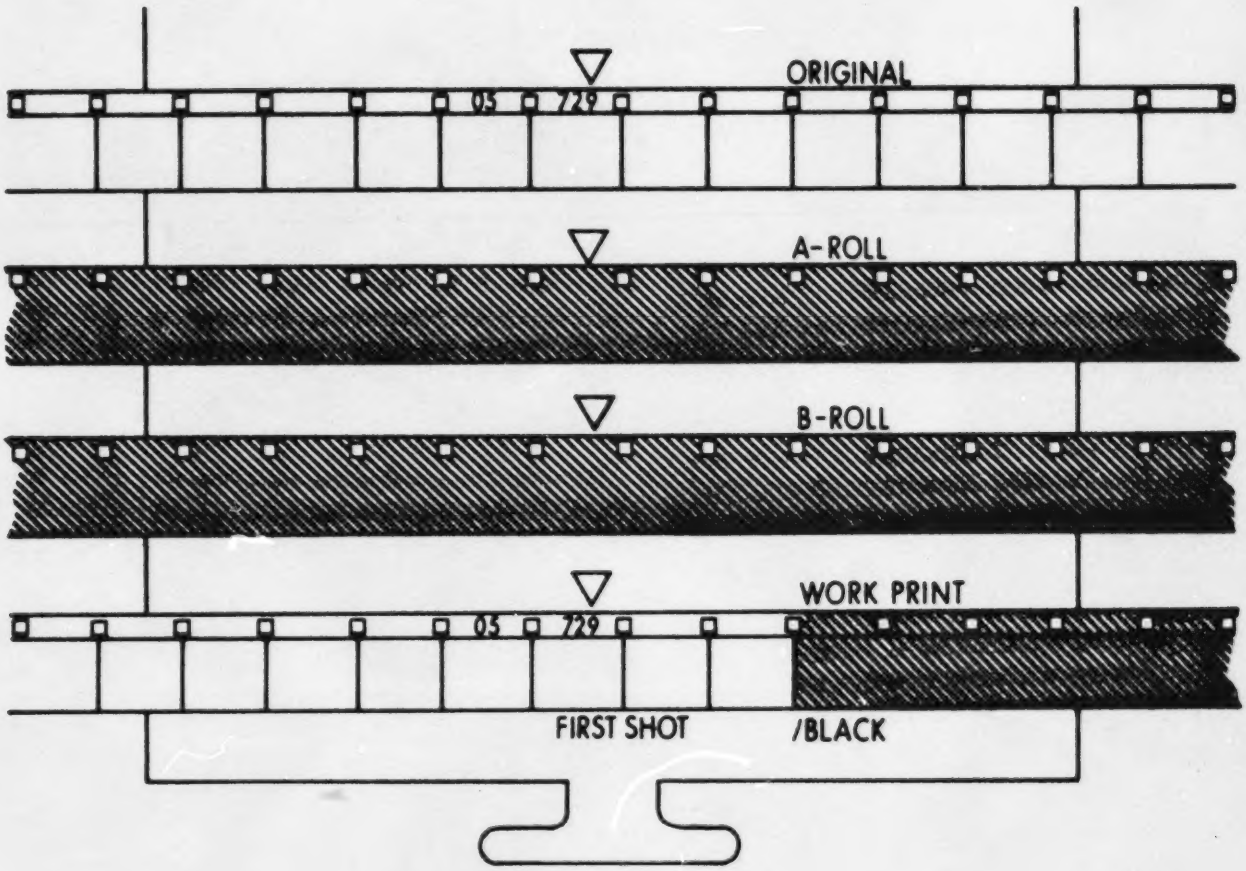
Call one of the leaders, "A-roll" and write on the beginning, "A-ROLL, HEAD," and the name of the production. On the other roll, write "B-ROLL, HEAD," and name of production.

3. Now to cut the first shot. First you must find the first edge-number on shot number one in the work print. Roll the work print forward until the last 3 digits of the first number are exactly on top of the sprocket wheel. There is an arrow on the frame of the synchronizer by each of the four wheels to make it easy for you to find the exact top of the sprocket wheel.



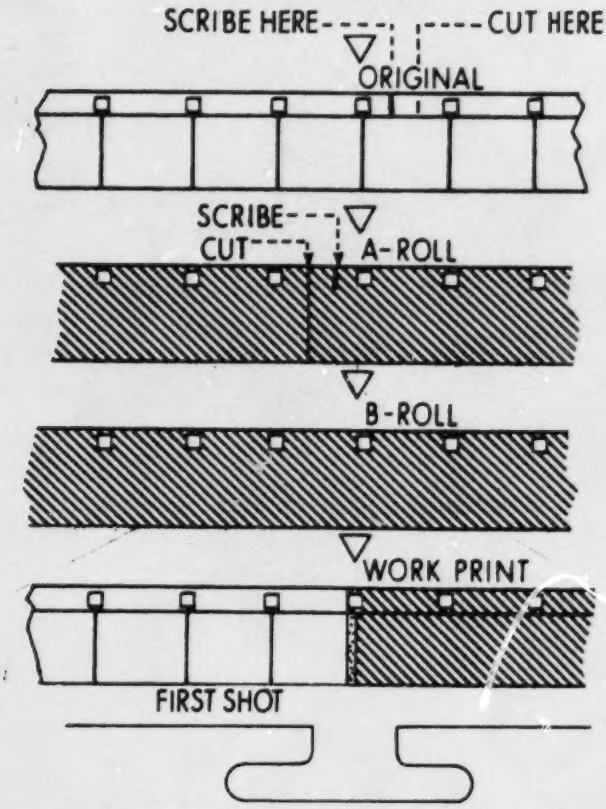
Here it is, in this example. It is edge-number 05729. 729 is straight up.

4. Now we look in the place where we have stored all of the "pulled" original shots. Find number one. Remove the tape, and holding the roll in your left hand (the one wearing the cotton glove!) slowly pull the film off the roll, watching the edge number until you come to 05729. Unlock the last sprocket wheel lock of the 4 gang synchronizer, and gently lower the original film onto the sprocket wheel, so that "729" is exactly in line with the same "729" on the work print. Lock the film in place.



Now that you have lined up the original footage with the work print, using the edge numbers, it is a good idea to look at the pictures on both the original and the work print. They should be identical.

5. The next thing to do is to roll the synchronizer wheels backward to the left to the splice at the beginning of the shot in the work print. Unlock the brake, and slowly turn the handwheel in front until the splice is in line with the index arrows on the synchronizer.



BEGINNING OF SCENE 1
IN THE WORK PRINT

6. When you have lined up the splice on the work print with the index arrow on the synchronizer, pick up the sharp pointed steel scribe and carefully scratch a tiny mark on the original, to the right of the sprocket hole (see diagram above). The scratch mark should be on the edge of the film, not in the picture area.

   Next, make a similar scribe scratch on the edge of the black (opaque) leader on the A-roll, at the same sprocket hole, but on the left side of the hole (see above).

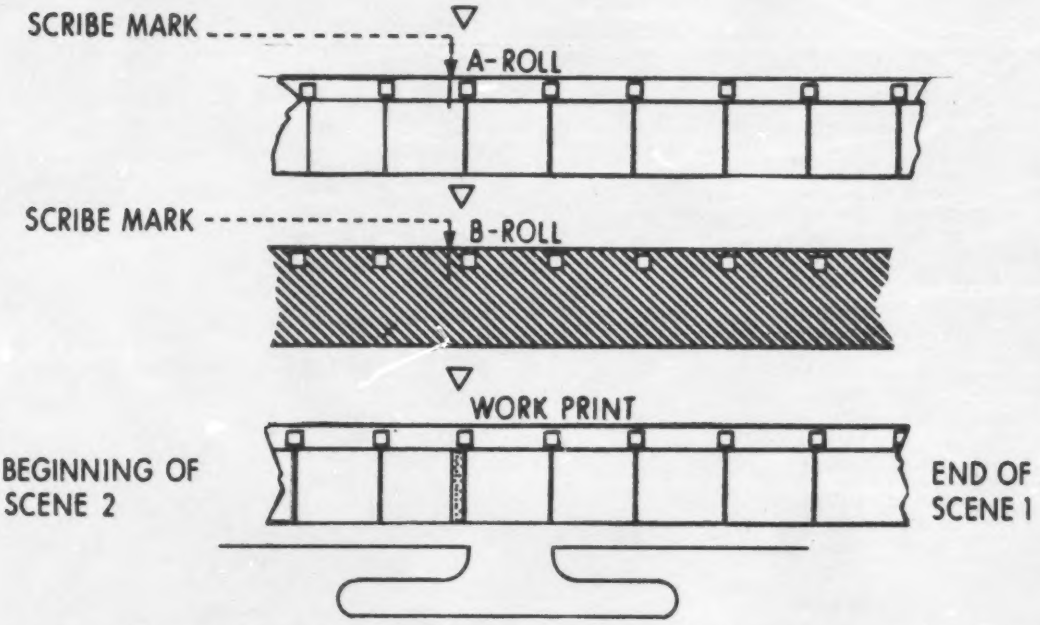
7. Now you can unlock the last (4th) sprocket wheel, and remove the original. With your scissors cut through the center of the frame containing the scribe mark. (Do not unlock any of the other three sprocket wheels!).

8. Now turn the films to the left with the handwheel, and with your scissors cut through the middle of the frame containing the tiny scribe mark in the black leader on the A-roll.

   Now splice the head of the original film of shot number one to the black leader on the A-roll. Remember, scrape the emulsion off the picture only!

   The original film ahead of the splice which you cut off, is called an "original trim." You should carefully roll up the original trims on a reel. You can never tell when you might need them!

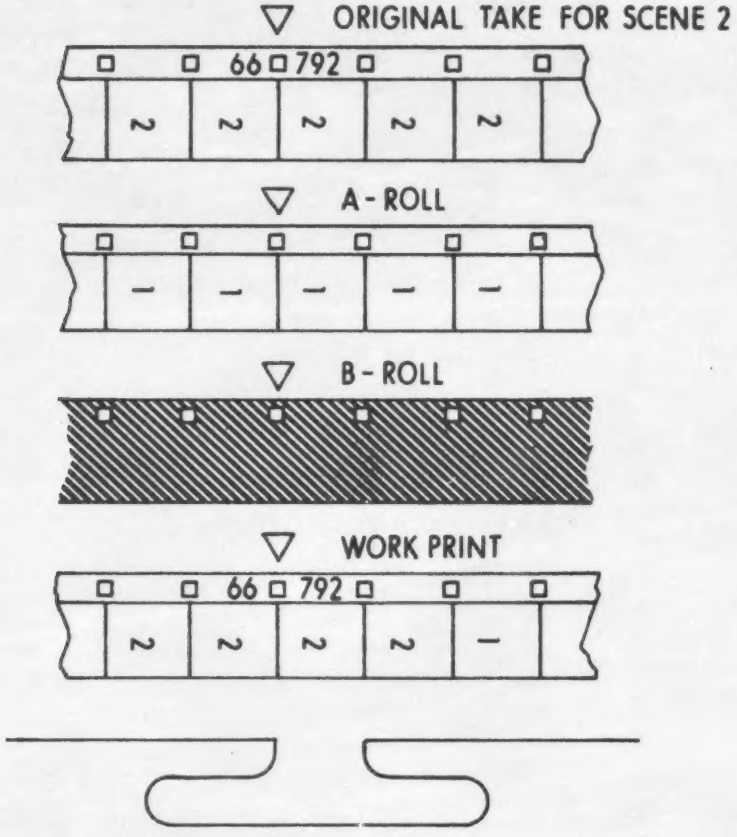
9. When the splice is dry, you can begin winding the three strands of film to the right, onto the take-up reels. Continue doing this, slowly feeding the original film into the synchronizer with your gloved left hand, until you come to the splice at the end of scene number one on the work print. This is also the beginning of scene number two. Line up this splice with the index arrow on the synchronizer.



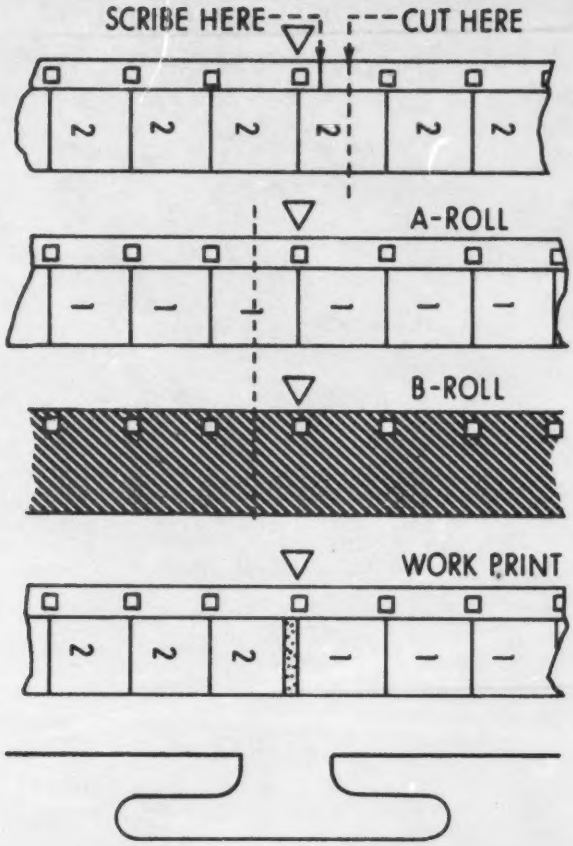
Check to see that you have accurately lined up the splice on the work print with the index arrow on the synchronizer. Now make a scribe mark to the left of the sprocket holes on the original footage on the A-roll and the black leader on the B-roll. (See above diagram.)

10. But do not cut those films yet! Instead, roll the films forward (to the right) until you have lined up (on the index arrow) the first available edge number on scene 2 on the work print. Lock the brake on the synchronizer, and locate the camera "take" marked "2" in your supply of original shots. Remove the tape, and carefully unwind the film in your hands until you come to the desired number, which is the one on the work print.

11. As before, open up the fourth channel, and carefully place the original on the sprocket teeth of that wheel, with the edge number in line with the index arrow. Lock that film in place as follows:



12. Then release the brake on the synchronizer and wind the four wheels backward (to the left, back to the splice between scenes one and two).

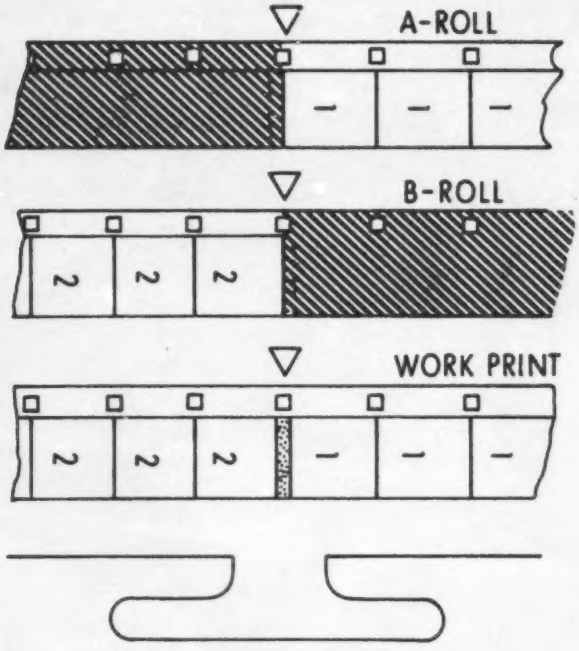


13. As soon as you have lined up the splice between scenes one and two (on the work print) with the index arrow, then scribe the original scene two (on the 4th wheel) to the right of the sprocket hole. (See above diagram.) Then open the lock on wheel four, and with your scissors cut through the middle of the frame with the scribe mark.

14. Now roll all film to the left, and with your scissors cut the tail trim of scene one on the A-roll through the middle of the marked frame, and also cut through the middle of the marked frame of the black leader on the B-roll.

15. Now splice the beginning of the new scene (scene two) to the end of the black leader on the B-roll. (Remember, the B-roll will have all of the even-numbered scenes) SCRAPE PICTURE ONLY!

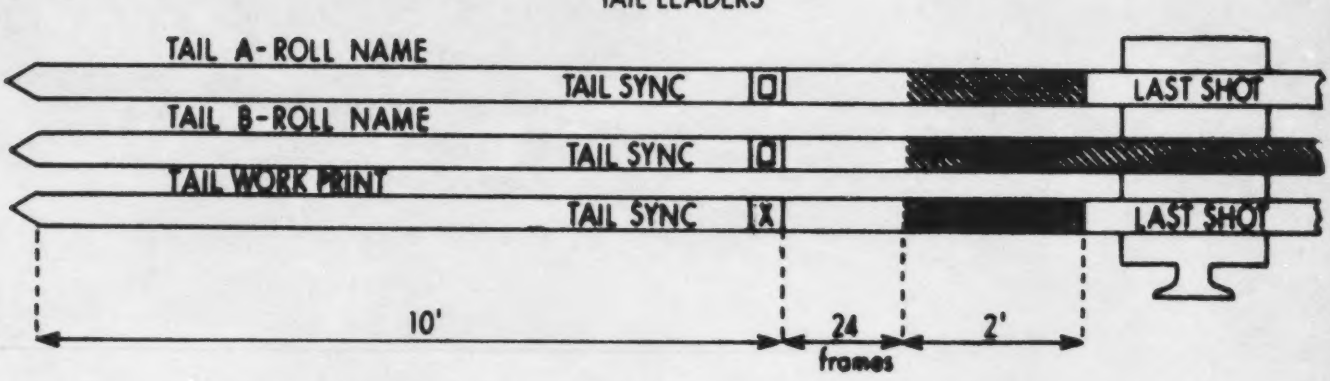
16. To the trimmed end of scene one now splice the supply of black leader. Remember, always scrape the picture! Now your synchronizer will look like this:



Roll up the tail trim of scene one and the head trim of scene two on your reel of "original trims" to save for possible future use. (Someday, after the film is finished, it will be safe to throw those original trims away.)

You have now cut the original for the first two scenes of the production. Continue in this way, working slowly and carefully, until that happy time when you finish the last scene. You will find that you will have to work very slowly at first, checking every step, but as you go along you will develop a rhythm, and the work will speed up. But never hurry, because that is when mistakes are made. It may be a good idea for two people to begin this A and B cutting, with one reading the instructions as the other does the actual cutting. But normally this is a one-person task.

17. When you reach the end of the last scene, splice opaque leader onto it. There will of course be black leader on the other roll. You must now splice on "tail leaders" like this:



If you have not already done so, splice two feet of black leader onto the last frame of the last scene in the work print. Then splice about ten feet of yellow leader onto the black. Make tail leaders for the A and B rolls of original as in the above diagram. Note that punches are made in the yellow leaders 24 frames from the end of the two feet of black leader. These cue marks are for the use of the laboratory. Write the necessary information on the yellow leaders as above also for the use of the laboratory. Besides the name of the film you might want to write also the name of your organization. Use permanent, waterproof marking pens.

All that is left now is to rewind all the rolls and send them to the laboratory, for a print to be made. It is a good idea, but not absolutely necessary, to send the work print also, in case the laboratory wants to check the A and B rolls against your work print. But if you have been careful there should be no problems. You may have noticed that all splicing is done on the left side of the synchronizer, and that the

only wheel of the synchronizer that was ever opened after the work began was the fourth wheel, at the back. The other wheels remained with the strands of film locked on them.

This then is the procedure for cutting A and B rolls, so that you may obtain a print which will not show any splices when it is projected. But there are some other advantages which you can realize from this procedure, which make the system even more valuable to the film producer. Because you have decided not to cut the original into a "single strand" but instead into A and B rolls you also have available to you the possibility of having some useful effects:

A) Dissolves,

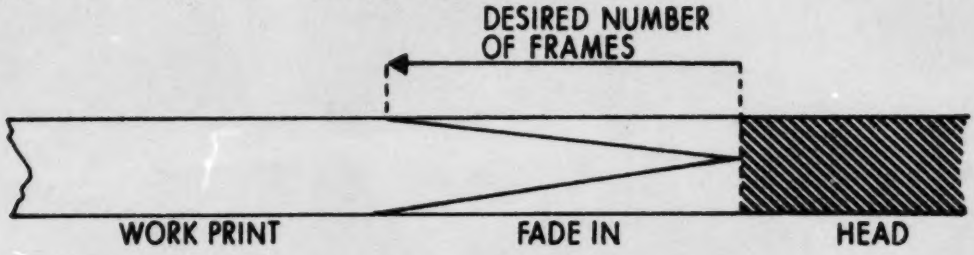
and

B) Superimpositions

First we will consider dissolves. What is a dissolve? It is the gradual blending of the end of one scene into the beginning of the next. A straight cut (which we have been cutting on the A and B rolls) is a sudden change, while a dissolve can be more gradual, suggesting a change of locality or time. Dissolves can be of different lengths, some very short, like a "soft cut," and others quite long, lasting two or three seconds, or even longer.

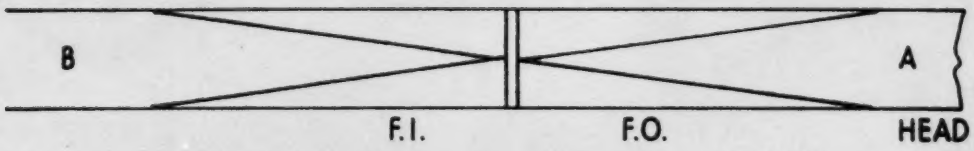
Before we can understand how to obtain a dissolve, it is necessary to understand another effect which is used by film producers, and that is the FADE. If a scene starts from black on the screen, and slowly gets brighter until it is clearly seen, we call it a FADE-IN. (It is like the curtain going up at a stage play.) Very often a FADE-IN is used at the beginning of the first scene in a film. A FADE-OUT is the opposite--the scene gradually becomes darker, and finally black. (Like the curtain coming down--the end of the play.) The "fade-out" is generally used at the end of a major sequence, or at the very end of the film. If there are fades in the body of the film (that is, not at

the end or the beginning) then they are generally used together. Fade-Out one scene, followed by a Fade-In for the next scene. The decision to make these effects is made by the editor. This is how a Fade-In is marked on a work print:

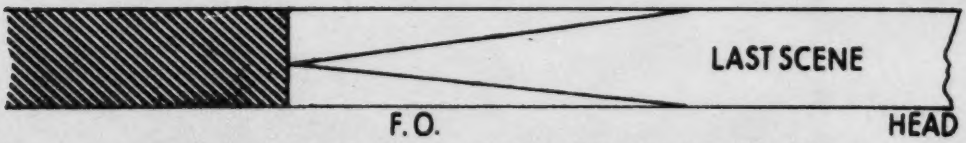


Generally the marks are a long "V," as above, and the length of the fade is indicated by the length of the lines. (24 frames equals one second.) A wax pencil (or "grease pencil") is most often used for marking effects.

A fade-out, fade-in between two scenes would be marked like this on the work print:



And a fade-out on the last scene in a film would look like this on the work print:



But how is a fade-in or a fade-out actually produced? First you must communicate to the laboratory exactly where you want the fade to be, and how many frames it should take. This information could be communicated to the laboratory by sending them the edited work print, marked properly with a grease pencil. Or you could write a note to the laboratory telling them this information. You would use your synchronizer to measure how many feet and frames there are from the

"START" punch to the splices where the fades are to occur. Here is an example of such a note:

FADE SCHEDULE		
EFFECT	LOCATION	LENGTH
Fade-in	10 feet 5 frames	24 frames
Fade-out	150 feet 20 frames	36 frames
Fade-in	150 feet 20 frames	36 frames
Fade-out	360 feet	24 frames
All measurements are from "START" punch		

With this information, the laboratory technician who operates the printing machine would program the printer so that in the beginning the printing lamp was out. In the above example, at 10 feet and 5 frames from the START punch, the printing lamp would slowly become brighter, so that in 24 frames it would have reached its normal printing intensity. The result : A one second fade-in from black on the first scene in the print.

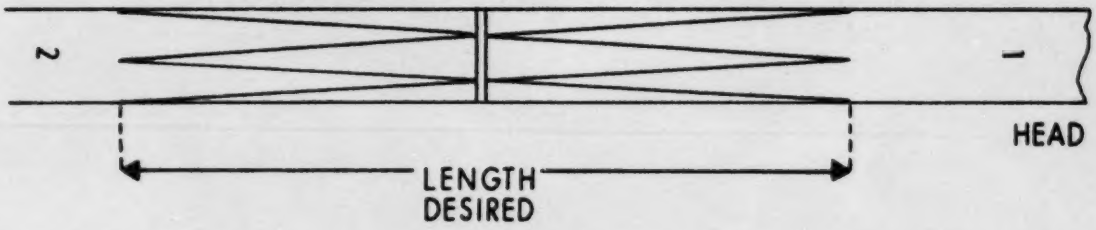
Similarly, the operator would program (control) the printing machine so that at 36 frames before 150 feet 20 frames the lamp would begin to dim, and it would be all out by 150 feet 20 frames, and then would immediately begin to brighten again, reaching its normal printing intensity 36 frames later. The result: A smooth fade-out, fade-in lasting a total of 72 frames, or three seconds, in the release print.

So as you can see, fades are made by controlling the intensity of the printing light. Such fades, as described above, could be made in a single strand printing operation. That is, A and B rolls are not required for fades. But they can be ordered for A and B rolls just as

easily. The printing machine operator will simply make a note of which rolls contain the scenes which have to be faded-in or out. Remember, each roll, A and B, is printed separately, so fades can be made on one or both rolls during printing.

This capability, of producing fades on both of the A and B rolls, leads to a very interesting possibility. What if we programmed a fade-out on one roll at the same place where we had a fade-in on the other roll? A combination fade-in, fade-out turns out to be a DISSOLVE! On the work print a dissolve is marked with grease pencil like this, two fades together:

DISSOLVE AS MARKED ON WORK PRINT



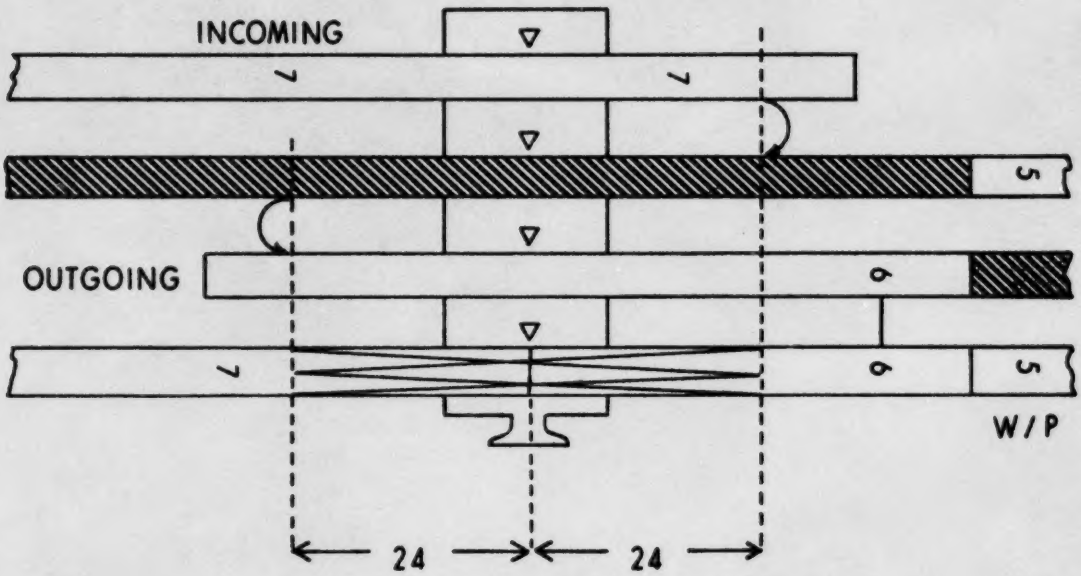
(example: 48 frames)

The middle of the dissolve is at the splice between the two scenes. Scene one fades-out as scene two fades-in.

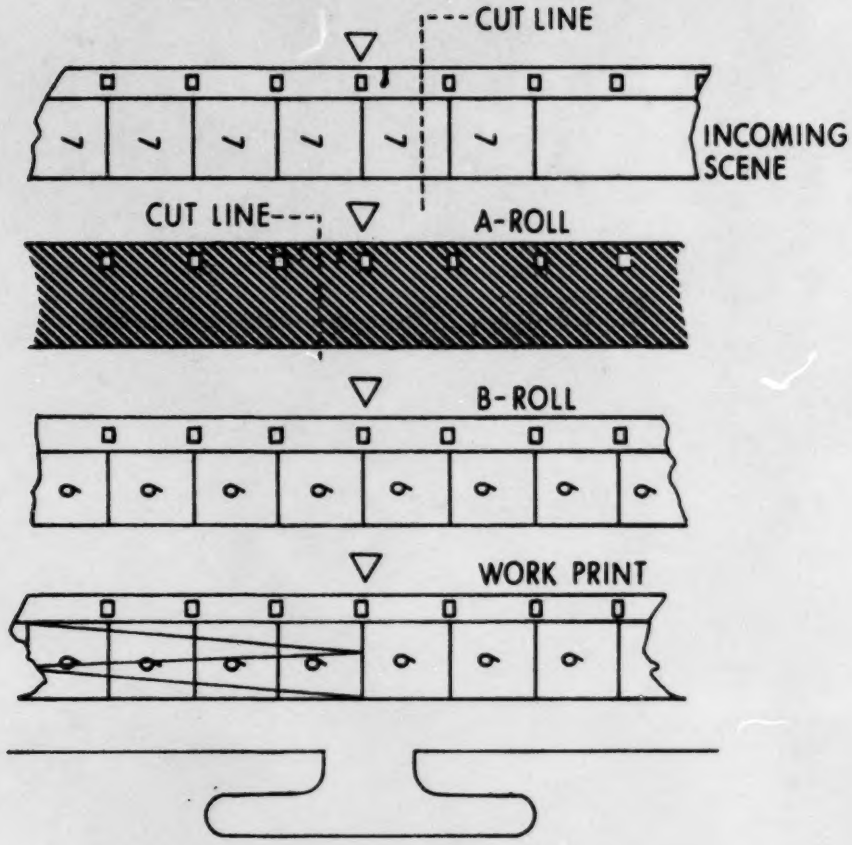
In order to obtain fades, all you have to do is to inform the laboratory, either by sending the marked work print, or a "fade schedule," as described earlier. But for dissolves you have to do more than this! As you can see by the above diagram, scene one does not finish its fade-out until 24 frames after the splice! And scene two begins to fade in 24 frames before the splice! This is accomplished by the following procedure, when you are cutting A and B rolls. Let us imagine that you have been cutting A and B rolls of originals, all straight cuts, when you suddenly find that the picture editor has marked a dissolve on the work print, as in the above example of a dissolve. You now must proceed with caution!

As usual, line up the proper edge number of the "incoming" shot with its corresponding first number on the incoming shot in the work print.

Everything is normal. The "outgoing" original shot will already be in sync with the corresponding shot on the work print; you did that at the head end of that shot. Now to make the scribe marks for cutting. They are put in different places for a dissolve. The principle here is to let the outgoing shot in the original continue to the end of the dissolve (in this case 24 frames beyond the splice), and to allow 24 more frames beyond the work print splice in the incoming shot. This probably sounds confusing, but study this diagram:

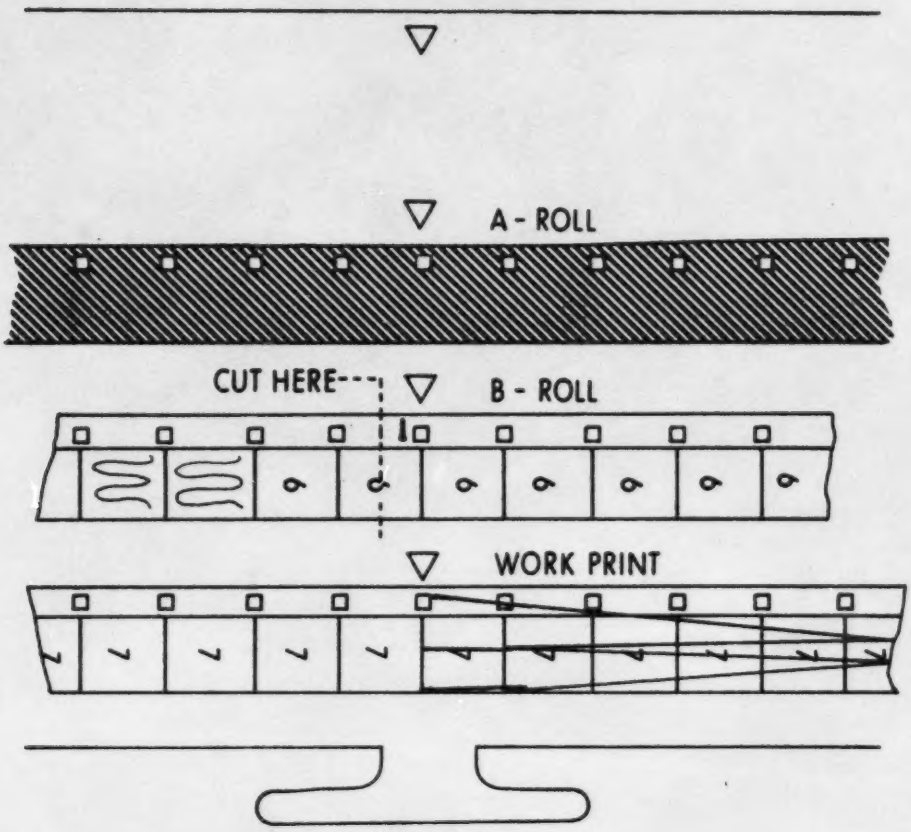


Incoming scene number seven has been laid in the fourth wheel of the synchronizer, so that its edge numbers are in line with the same numbers on the work print. However, instead of cutting scene seven at the splice line of the work print, allow 24 more frames to the right. Make a scribe mark there to the right of the sprocket hole and on the black leader on the A-roll, make the scribe mark on the left of the same sprocket hole, as shown in this diagram:

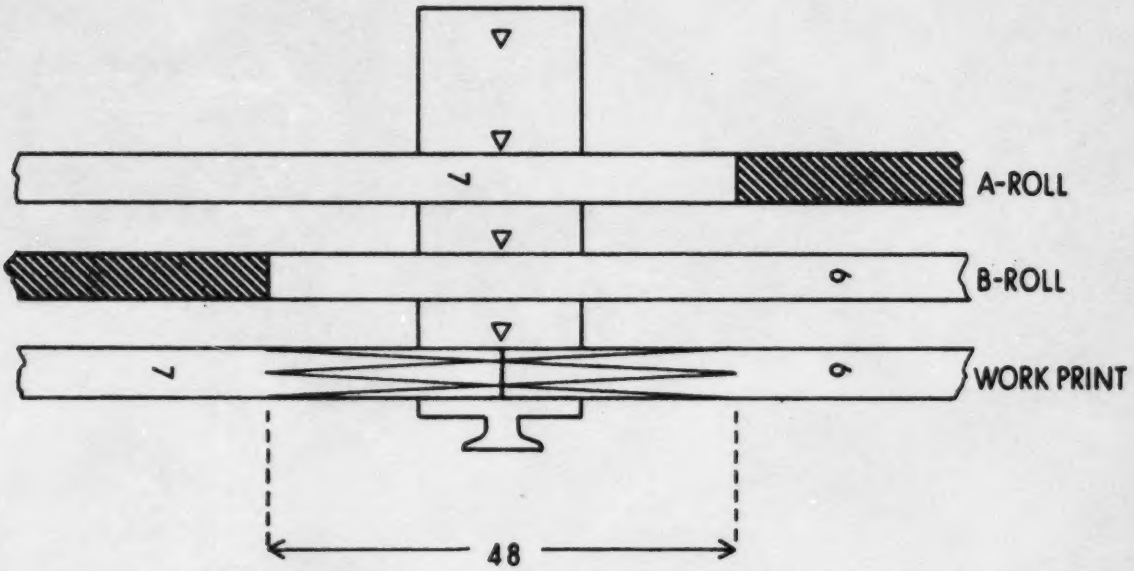


After you have made the scribe marks, open channel number four, and cut through the middle of the frame with the scribe mark. Turn the handwheel to move the films to the left, and cut through the black leader on the A-roll in the middle of the scribed frame. Splice scene seven to the black leader on the A-roll. ("SCRAPE THE PICTURE")

Now roll the film to the other end of the dissolve lines on the work print, to mark the outgoing scene (number six) for cutting, as in the following diagram:



On the B-roll channel, above, you will see the scribe mark just to the left of the sprocket hole which is at the end of the dissolve lines on the work print. After scribing, turn the handwheel to bring the films out a little to the left, and cut the tail trim on scene six (in this example) and splice the end of scene six to the supply of black leader. (Remember, SCRAPE THE PICTURE.) You have now completed the cutting of the original for a 48 frame dissolve. (In this example, it was a 48 frame dissolve, but it could have been some other length, as indicated by the grease pencil lines on the work print.)



This is what the synchronizer would look like after you have finished splicing the end of scene six to the black leader. You can see how the A and B rolls overlap each other. This completed the cutting for this effect.

IMPORTANT! It is not enough to cut the original and hope that the laboratory will make a dissolve at that point. <u>You must tell them</u>, in a letter of instructions. For example, you might say:

"There is a 48 frame dissolve between scenes six and seven"

or

"There is a 48 frame dissolve at 128 feet 10 frames, as measured from "START" punch in the head leader." Notice that the footage is measured to the splice between the two shots in the work print. You probably will have a number of dissolves and some fades. Tell the laboratory where you want them, and how long (number of frames) you want them.

And finally there is one more benefit you can get by using the A and B system. You will remember that the A-roll and the B-roll are printed separately onto the print stock.

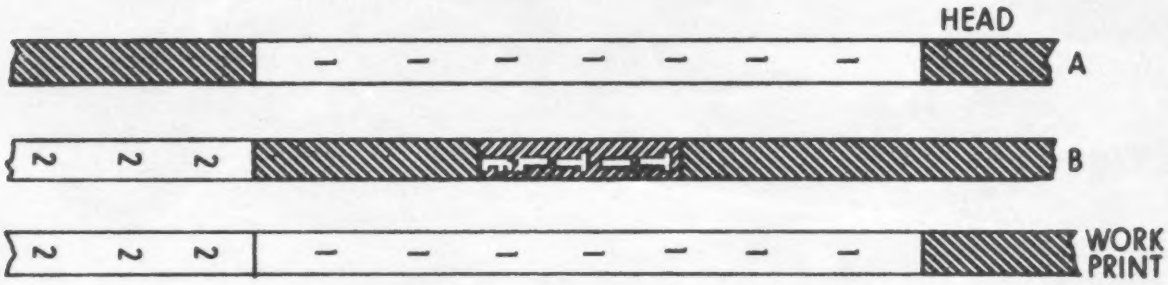
If you want one scene to appear on top of another scene, you merely cut the scene into the black leader opposite the desired scene on the other roll. The results on the release print would be a SUPER-IMPOSITION, two scenes seen at the same time. Sometimes this effect can be quite useful, but it should be used very rarely, as it might be confusing to the audience. Usually you see this effect when a person is seen thinking of another place or time, and we see super-imposed over the thinker the scene he is thinking about.

But a much more common use of superimposition is for printing white titles and captions over a live action scene. Many educational films have such titles, as they are very attractive, compared to the alternative, which is a separate shot of a title card.

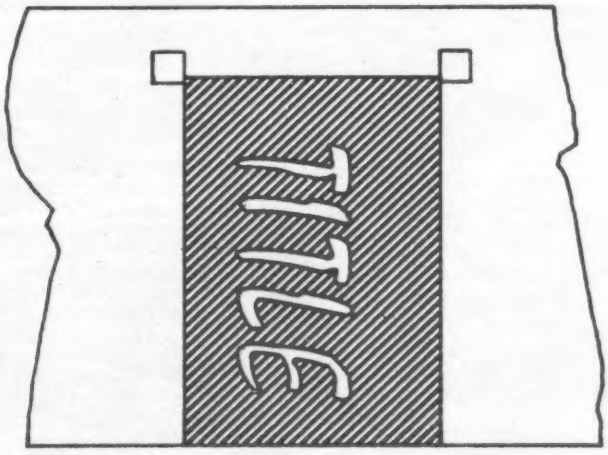
Here is how you would prepare superimposed titles, for 16 mm reversal color film:

1. Prepare the actual lettering, which should be black printing--could be press-type transfer letters, black cut out letters, hand drawn India ink letters, etc.
2. Then photograph the title cards on black and white high-contrast copy film, preferably 4 inches by 5 inches. This will give you a negative, which will have clear letters on an opaque background.
3. With a 16 mm reflex camera loaded with Black and White film, such a Plus-X Reversal, photograph the 4" x 5" negative, which should be on a light box, so that the camera sees only white letters. The resulting 16 mm black and white film will also be black, with clear letters. Shoot enough so that the audience will read them slowly.

4. Decide on which scenes you want the white titles to appear over. This is generally the first scene in a film, but the titles could also be superimposed over some other scenes, but near the beginning of the film. Try to superimpose this type of title over a fairly dark scene. White titles are difficult to read superimposed over a white cloud!



In this example the title footage has been cut into the black leader opposite the first scene. Actually one frame of the title footage might look like this, being black film with clear letters:



Thus you have learned how to prepare film for the laboratory, using either a single strand or A and B rolls. You know the advantages and disadvantages of doing your own original cutting, and the advantages of the A and B system:

1. Invisible splices
2. Dissolves
3. Superimpositions

Good luck!